

## 11.0 WATER RESOURCES ELEMENT

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The *Water Resources Element* of the **Sedona Community Plan** is presented in the following sections:

- 11.1 Background
- 11.2 Key Issues
- 11.3 Recommendations
- 11.4 Action Program



## **Overview**

From the inception of the community planning process, as well as the many previous efforts, preservation and protection of its water resources has been important to the citizens of Sedona. The importance of preserving and protecting the water supply is not only for the citizens and visitors of Sedona, but is also important to the economy of Sedona. Water is a vital resource for life and a healthy economy. The proper long-term stewardship of this resource will ensure its long-term supply for future generations and will help to ensure that the economy can continue to be stable and grow.

At the present time, two private water companies, Oak Creek Water Company and Arizona Water Company, are certified to provide water service within the City. The Arizona Corporation Commission regulates the activities of these private water companies, particularly those related to rate setting. Water quantity management responsibilities are currently administered by the Arizona Department of Water Resources.

## 11.1 BACKGROUND

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### Water Sources

Surface water is all water in streams, rivers, lakes, and ponds, as well as floodwaters and water flowing in underground channels. A person who first puts surface water to beneficial use acquires a prior appropriation right to continue using that amount of water. In times of shortage, users with older water rights should get water, while more junior appropriators go without, but enforcement is difficult. Surface water rights may be forfeited if they are unused for five years or put to non-beneficial use.

Groundwater is all water under the surface not flowing in underground streams. Generally, water seeps down through the pores, cracks, and fractures of rocks, and in the spaces between sand and gravel. Groundwater occurs when these spaces are filled or saturated with water. If there is enough groundwater to supply a well or spring, the zone of saturation is considered an aquifer. In Arizona, most of the water that seeps into aquifers (recharge) comes from streams fed by mountain runoff. Additional recharge occurs when crops and turf are irrigated and from stormwater and municipal discharge of treated sewage.

Typically, Northern Arizona aquifers are characterized by fractured rock; in many places, wells must be drilled to great depths, and may yield little or no water. To tap groundwater, a well must be drilled deep enough to penetrate the water table, which is the surface of the zone of saturation. When pumping occurs, the water table near the well typically drops, creating a cone of depression. If more water is pumped from an aquifer than is recharged, overdraft occurs which results in the drop of the water table.

Historically, the right to use groundwater belonged to whoever owned the overlying land. Because wells often draw water from beneath neighboring lands and can pump aquifers dry, conflicts often arise. The 1980 Groundwater Management Act established the Department of Water Resources which regulates groundwater use in the Phoenix, Pinal, Prescott, Santa Cruz, and Tucson Active Management Areas (AMAs), where groundwater levels were dropping. In these areas, existing pumpers were granted rights to continue pumping, but severe restrictions were put on large new wells.

Yavapai County contains significant portions of several drainages, including the Verde, Agua Fria, Hassayampa, and Bill Williams Rivers. The majority of the County's population and water users, reside within the Verde River drainage system. Water resources within a portion of this system are currently managed by the Prescott Active Management Area. Through the Groundwater Management Act requirements, communities in this AMA have developed current use and projected needs water budgets that allow the AMA to focus its water management goals. This is not the case for the cities, towns and other unincorporated areas within the Verde Valley.

Ground water is essentially the only available source for future supplies because all the surface water is fully appropriated. However, water rights of surface uses can sometimes be acquired and converted to municipal use through severance and transfer and/or change of use pursuant to Arizona water rights laws.

Fractures and vertical and lateral changes in lithology in the regional aquifer constitute the main problem in the location of large yielding wells. Large yields may be obtained from wells drilled in the alluvium along Oak Creek; however, water in the alluvium is in hydraulic connection with the flow of Oak Creek, and large ground water withdrawals will reduce flow in the creek (Arizona Water Commission Bulletin II, *Water Resources in Sedona Area*, April 1980, Geological Survey of the US Department of the Interior).

## **Summary of Existing Water Supplies**

Sedona is located in what Arizona Department of Water Resources (ADWR) classifies as the Verde Valley Sub-basin. This sub-basin includes 2,600 square miles bounded by the Mogollon Rim to the northeast, Big Black Mesa to the northwest, the Black Hills to the southwest, and Fossil Creek to the Southeast. The shallow alluvial aquifer occurs within the floodplain of the Verde River and saturates gravels, sands, and silts to a thickness of less than 50 feet. The principal aquifer occurs in a thick sequence of flat-lying limestones and sandstones throughout the area. Groundwater, as does surface water, follows the surface gradient toward the Verde River and exits towards the southeast through the Verde Canyon. Ground water levels in wells tapping the principal aquifer occur generally at a depth less than 800 feet below land surface (Owen-Joyce and Bell, 1983). In most areas groundwater occurs under unconfined conditions, however, confined conditions do exist locally within the Verde Formation. Generally, all aquifers are hydraulically connected. Wells produce an average of about 30-150 gallons per minute (Owen-Joyce and Bell, 1983). In many places, locally perched sources of water from fractured or decomposed granite, and volcanic rocks, provide lesser amounts to wells.

Owen-Joyce and Bell (1983) estimated average inflow to and outflow from the regional aquifer. No appreciable changes in water levels have occurred in the sub-basin. Outflow which is assumed to equal inflow in a steady-state system is essentially unchanged. Recharge to the regional aquifer is from infiltration of precipitation in the higher elevations with small contributions from surface water in lakes and streams. Total recharge to the sub-basin is estimated at 138,000 acre-feet per year. Groundwater underflow from the Big Chino sub-basin and outflow to the Verde Canyon sub-basin is assumed to be negligible (Owen-Joyce and Bell, 1983). Current pumpage is approximately 8,000 acre-feet per year. Groundwater which discharges to tributaries of the Verde River maintains a base flow of about 80,000 acre-feet per year on the Verde River at the gaging station, Verde River near Camp Verde (Owen-Joyce and Bell, 1983). Evapotranspiration and irrigation consumptive uses are estimated at 35,000 and 31,000 acre-feet, respectively. Water that is not diverted for irrigation or infiltrates back to the regional aquifer leaves the basin as surface water outflow.

In Sedona, the main source of ground water supply is from the sandstone of the Supai Formation and the underlying Redwall and Matin Limestones. Depths to water varies from about 180 to 1,000 feet below land surface. Arizona Water Company's Sedona wells produce an average of about 350 to 375 gallons per minute. Arizona Department of Water Resources has recorded ground water level declines of less than one foot per year in the Sedona area (1992). However, Oak Creek Water Company and Arizona Water Company have both indicated that they have not experienced any significant change in water levels in the last 50 or so years. Groundwater underflow through the Sedona area is estimated to be about 12,000

acre-feet per year. Current withdrawals are about 2,350 feet per year. Committed additional demands amount to about 3,227 acre-feet per year (Arizona Department of Water Resources, 1990).

## **Oak Creek Water Company**

The Oak Creek Water Company is one of two private companies supplying water to the Sedona community. The Oak Creek Water Company was formed in 1947 and has been in operation since 1953 when the company was incorporated. The company was developed to supply domestic water to property owners and residents in the Oak Creek area.

The Oak Creek Water Company relies exclusively on groundwater for its water supply. Groundwater is supplied by three wells that are owned, operated, and metered by the company. The total storage capacity of the system is 354,000 gallons. In 1998, the Oak Creek Water Company had over 640 residential and commercial connections and serves an estimated population of more than 1,200.

Part of the Oak Creek Water Company's five-year plan for future requirements includes an additional well and storage capacity between 150,000 to 200,000 gallons. Also included are plans to re-drill the #2 well and have emergency power to pump water to storage tanks should power fail. During the 1996-1997 drought, the company lost one well and had to drill another one in a different location. Since 1964, a new well has been added along with pressure and storage tanks. In 1993, Oak Creek Water Company sold 185,500 gallons of water to the Arizona Water Company.

## **Arizona Water Company**

The Sedona water system is one of many water systems currently owned and operated by Arizona Water Company. Arizona Water Company was established and has been in operation since April 1955. Many of Arizona Water Company's water systems were originally owned and operated by Arizona Public Service prior to 1955. The Sedona water system was developed for the purpose of supplying domestic water, although Arizona Water Company also furnishes treated effluent and untreated Central Arizona Project water in its water systems where such supplies are available and there is a need for such water services.

The Sedona water system relies exclusively on groundwater for its source of water. The water supply is generated by thirteen wells; eight in Sedona and five in the Oak Creek area and has a total storage capacity of 3,677,800. The Sedona water system owns and operates all wells and storage facilities and meters all water production and water deliveries.

The Sedona water system has realized a steady increase in customers. As of October 2001, Arizona Water Company serves approximately 4,490 Sedona residents and 568 commercial customers.

The Sedona water system performs water use planning and has negotiated agreements with the Oak Creek Water Company and the Big Park Water Company to purchase water during times of serious water shortages. Both the Arizona Department of Transportation and the US Forest Service have purchased water from the Company. The Company's planning efforts have been affected by increased population of

the area and, thus, its ability to meet the growing demand for water in its service area. As a result, Arizona Water Company is currently identifying and developing new and additional water supplies for its Sedona water system to meet the increasing demands. The Sedona water system has experienced more of an impact from the recent customer growth than from the 1996-97 drought.

## Water Production

Keeping consistent with recent growth, the amount of water produced from area wells has slowly increased. In 1998, water produced from Arizona Water Company's Sedona wells, not including the Village of Oak Creek, was 765 million gallons. In 2000, 926 million gallons were produced. The average gallons per minute (gpm) produced in 1998 was 1,375; 1,656 gpm in 1999; and, 1,760 gpm in 2000.

The total pumping capacity for Arizona Water Company's Sedona system (including Village of Oak Creek) in 1998 was 2,431 gpm, 3,117 gpm in 1999 and 3,566 gpm in 2000.

According to Arizona Water Company, at the end of 1990, annual water production was about 530 million gallons and in 2000 1,013 million gallons. Well production capacity in 1990 was about 2,100 gallons per minute (g.p.m.) and about 3,600 (g.p.m.) in 2001. Storage capacity was about 2.5 million gallons in 1990, and about 3.7 million gallons in 2001. Annual water production numbers include Village of Oak Creek.

Table 20  
**Arizona Water Company Overall Storage, Production Capacity and  
 Annual Water Production**  
*(Figures include Village of Oak Creek)*

| <b>Year</b> | <b>Total Storage Capacity (gallons)</b> | <b>Total Well Production (gallons)</b> | <b>Well Production Capacity (gpm)</b> |
|-------------|---|--|---------------------------------------|
| 1990        | 2,467,800                               | 530,516,000                            | 2,131                                 |
| 1995        | 3,442,800                               | 728,825,000                            | 2,635                                 |
| 2000        | 3,677,800                               | 1,013,107,000                          | 3,556                                 |

Available water production per customer was 0.53 gpm in 1990 and 0.64 gpm in 2000 as compared with average annual customer usage of 0.23 gpm in 1990 and 0.33 gpm in 2000.

## Water Usage

Table 21  
**Arizona Water Company Residential Water Usage**  
*(Figures include the Village of Oak Creek)*

| <b>Year</b> | <b>Total Customers</b> | <b>Total Water Usage (gallons/year)</b> | <b>Average Total Water Usage (gallons/day)</b> | <b>Residential Customers</b> | <b>Residential Water Usage (gallons/year)</b> | <b>Average Residential Water Usage (gallons/day)</b> |
|-------------|------------------------|---|--|------------------------------|---|--|
| 1990        | 4,036                  | 493,364,400                             | 335  | 3,653                        | 350,377,700                                   | 263  |
| 1995        | 4,582                  | 674,573,100                             | 403  | 4,125                        | 464,638,500                                   | 309  |
| 2000        | 5,582                  | 956,129,500                             | 469  | 4,923                        | 649,197,700                                   | 361  |

According to Arizona Water Company, the average daily usage for Sedona residents was 361 gallons, which has increased over the years and is at or above average when compared to other Arizona Water Company systems. The following table shows the average residential water usage in various communities throughout Arizona for the year 2000.

Table 22

| <b>Community</b> | <b>Gallons per day per residential customer (Average)</b> |
|------------------|---|
| Sierra Vista     | 378   |
| Sedona           | 360   |
| Apache Junction  | 309   |
| Rimrock          | 227   |
| Superior         | 220   |
| Miami            | 215   |
| Oracle           | 196   |

Water use is also related to the types of residential land use; on the average, single-family residences utilize more water than multi-family residences.



## Residential Water Projections

The following projections are general. A final water demand analysis was underway in late 2002 and will provide more detailed information.

Using the Community Plan's mid-range population forecasts for 2015, approximately 8,096 total housing units are projected by that year. Based on the estimated 5,800 total existing housing units and the 2,977 potential additional units available July 1, 2001, there are 8,777 total potential housing units in the City when the residential land base is built out.

According to Arizona Water Company, the average daily usage for Sedona residents is approximately 360 gallons. Based on this average daily usage figure, average annual residential usage can be estimated at 131,400 gallons per household. Presuming the average annual household usage is approximately 131,400 gallons per household, total annual residential water demand can be projected.

As of 2001, the City of Sedona served an estimated total of 5,800 households. Based on the estimated average annual water usage of 131,400 gallons per household, it can be estimated that 762,120,000 gallons of water is needed to supply Sedona's current residential land base.

Projections indicate that Sedona will serve approximately 8,096 housing units in the year 2015. Using the estimated average annual water consumption of 131,400 gallons annually per household, it can be estimated that 1,063,814,400 gallons will be needed to meet residential demands in the year 2015.

When Sedona's residential land base is built-out it is projected that there will be approximately 8,777 housing units. Using the estimated average annual water consumption of 131,400 gallons per household, it can be estimated that 1,153,297,800 gallons will be needed to meet residential demands at build-out.

Table 23  
Annual Projected Residential Water Usage

|                   | Number of Housing Units | Average Daily Residential Water Usage (gallons/day) | Average Residential Water Usage <sup>1</sup> (gallons/year) | Annual Total Residential Water Usage <sup>2</sup> (gallons/year) |
|-------------------|-------------------------|---|---|--|
| <b>2001</b>       | 5,800                   | 360   | 131,400   | 762,120,000  |
| <b>2015*</b>      | 8,096                   | 360   | 131,400   | 1,063,814,400  |
| <b>Build-out*</b> | 8,777                   | 360   | 131,400   | 1,153,297,800  |

*\*Estimated base on current conditions*

*1 based on daily average water usage of 360 gallons per household x 365 days per year*

*2 based on annual water usage of 131,400 gallons per household*

## 11.2 KEY ISSUES

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Sedona's typically arid climate does not produce much surface water. The arid climate also increases water demand because most landscapes must be irrigated.

Sedona's precipitation generally comes in two "wet" seasons. Summer storms can produce intense downpours and flash floods. Winter storms are more important from a water supply perspective as they blanket the mountains and high country with snow, feeding streams and rivers with snowmelt.

Sedona is dependent upon private water companies to keep up with growth and to ensure adequate water storage and delivery systems. In addition, because water is supplied by private entities, water resource and water use data must be provided by the private water companies.

Water services in certain areas of Sedona are not served from gravity flow storage and can experience a loss of water pressure during power outages.

There is no comprehensive, long-term water supply plan in place. Existing water use data in the region is inadequate for the purposes of developing such a comprehensive water supply plan and there is need to further study water demands in greater detail. However, some work has been completed by the Arizona Department of Water Resources for the period from 1990-1997 and is published in a report entitled Verde Valley Watershed Study – April 2000. The information in this report is not community specific and does not provide water use projections. There is a need for a comprehensive database for area water resources.

Other communities have developed water supply plans as a result of completing hydrologic studies of regional groundwater supplies. This may be an important tool in understand existing water resources and potential water sources when considering future needs.

Arizona Water Company projects that the current trend of a steady increase in new customers may continue for the near future. Customer and usage projections are based on continued, steady growth in the community. Changes in the growth rate can affect the projected needs of the system. Based on current projections, and the assumption that well production is sufficient, Arizona Water Company has indicated the likely need for one additional million gallon storage tank in the Chapel area, an additional well site in east Sedona, and one additional well site in west Sedona (currently underway) by the year 2010. A tank site at the north end of Dry Creek Road was originally planned by the year 2010, but Arizona Water has now indicated that this projected time frame may be extended by several years. Arizona Water Company has included in its 2002 budget provisions for a new production well in west Sedona.

In addition, Arizona Water Company has expressed concern with locating a well site and/or tank site near its customers in the vicinity of SR 179, particularly in the Back-o-Beyond and Chapel areas. Essentially, there are no private lands available in the Chapel area on which to locate a water storage tank without creating major visual impacts in the area. More viable locations, from the perspective of Arizona Water Company exist on National Forest lands. This raises other issues relative to US Forest Service policies and coordination. The static water pressure in this area is good, however, if a fire hydrant is opened, water

pressure is dramatically reduced in the uppermost areas. Some possible options to alleviate some of the existing issues include constructing a bigger pump station, installing bigger water lines and upgrading water main lines in this area.

Oak Creek Water Company has also indicated that an additional storage capacity of 160,000 gallons will be needed by 2010 and will likely be accommodated at the existing location on Panorama Blvd.

The current average daily water usage for residential customers is of some concern. Water consumption figures indicate that a large portion of water usage is for exterior uses (i.e. landscaping). Water usage can more than double during the summer and fall months, depending on the monsoon season and other rainfall.

Concerns raised regarding impacts to the Verde River flow, as a result the potential Big Chino Basin groundwater withdrawals, facilitated the need for immediate water resource planning. The outcome of these concerns was the formation of the Yavapai County Water Advisory Committee (WAC). The Sedona City Council appointed a member of the Council to represent Sedona on this committee. Other participating cities, towns, tribes, and the Arizona Department of Water Resources also have members on this committee. The WAC, under the direction of the Yavapai County Board of Supervisors, functions as a county-wide consensus committee, working together to provide a water management strategy for Yavapai County. WAC's discussions focus on managing county-wide water resources in a sustainable fashion, maintaining economic viability, and protecting the aquatic and riparian environments. WAC's goals are to develop regional county water management strategies and to establish strong communications with all levels of government and stakeholders with goal implementation through the Yavapai Board of Supervisors.

WAC is currently working toward the development of a Water Management Plan. During 2000–2001, WAC began undertaking various steps of discovery and data gathering. WAC is also working with the Bureau of Water Reclamation, other water resource professionals on a technical committee to conduct a water balance study in order to identify water budgets for the Verde Valley communities. The water budgets will identify current conditions and will project future water requirements for each community in 5-year increments to the year 2025. A composite water budget projection for the entire Verde Valley area will also be generated in order to evaluate regional water management needs. These water budgets will be instrumental in regional, as well as local planning efforts and will help to more easily meet the general plan requirements established through Growing Smarter legislation and will help enhance the reliability of the groundwater model.

## 11.3 RECOMMENDATIONS

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### 11.3.1 Vision, Goals, Objectives/Policies

The Vision Statement, Goals, Objectives/Policies developed for the *Water Resources Element* of the **Sedona Community Plan** are presented below.

#### WATER RESOURCES VISION

*Ensure adequate water sources and associated infrastructure to serve the needs of existing and future water users in the City of Sedona.*

**GOAL 1.0 Support efforts to continue and improve regional cooperation and communication among appropriate agencies and communities in addressing water-related issues.**

##### *Objectives/Policies*

- 1.1 Support and assist the Yavapai County Water Advisory Committee (WAC) in researching and addressing water-related issues.
- 1.2 Assist the Yavapai County Water Advisory Committee (WAC) in developing a comprehensive water management program, including current conditions water budget and future water needs projections.
- 1.3 Support and participate in the preparation and utilization of a comprehensive database for groundwater supply and quality (Regional Water Resource Study) through cooperation with other appropriate jurisdictions and the local water companies to address the needs of future growth.

**GOAL 2.0 Work with private water companies to protect and manage water resources.**

##### *Objectives/Policies*

- 2.1 Work with appropriate agencies to develop policies, programs and facilities for local water management.
- 2.2 Assist the private water companies in long-range planning efforts, including identifying potential new water well and storage tank sites.
- 2.3 Research the relationship between water supplies and services, land use and growth of the

- region.
- 2.4 Research water programs to assist in land use decisions that protect water supplies.

**Goal 3.0 Encourage and promote water conservation.**

*Objective/Policies*

- 3.1 Work with private water companies in formulating and adopting a community-wide water resource conservation program to encourage conservation consciousness on the part of Sedona residents, business property owners and developers.
- 3.2 Support conservation and efficient water use in an effort to minimize the need for new water sources.
- 3.3 Provide education for voluntary water conservation. Plan and implement City educational programs and events promoting water conservation.
- 3.4 Partner with community organizations, service groups, and volunteers in conservation educational efforts.
- 3.5 Assist the private water companies in conservation efforts.
- 3.6 Promote the use of native low water use vegetation, especially drought tolerant plants in landscaping and discourage the inappropriate use of vegetation unsuited to Sedona's dry climate (e.g. riparian species in non-riparian areas).
- 3.7 Promote use of water-conserving irrigation in landscaping.
- 3.8 Analyze the costs and impacts of conservation programs to optimize their effectiveness.
- 3.9 Support the recommendations of the Yavapai County Water Advisory Committee that Yavapai County adopt golf course standards that ensure no depletions to the aquifer occur from the irrigation of golf courses and to encourage the use or re-use of effluent (see Appendix – Proposed Golf Course Water Use Regulations).

**GOAL 4.0 Develop and implement a program for the reuse of water.**

*Objectives/Policies*

- 4.1 Research and implement programs to increase the use of reclaimed water, gray water and effluent.
- 4.2 Develop incentives to encourage the use of reclaimed water.

#### 4.3 Identify potential reclaimed water customers.

### **11.3.2 Specific Recommendations**

#### **Water Supply**

Although the need to better understand the area aquifer was identified early in the Sedona community planning process in 1990, the public perceived this issue as a much higher priority in 1997. In 1998, the Council-appointed Advisory Committee on Growth recommended that a regional water resource study be conducted.

Existing water use data in the region is sparse or contains uncertainty. Developing a current conditions water budget will require a significant amount of data acquisition. The City should also determine how the community's water needs might change in the future and develop water budget projections.

The City should assume an active role concerning Sedona's groundwater supply of the area aquifer. The City should work with ADWR, NACOG, ADEQ, Yavapai County Water Advisory Committee (WAC) and other appropriate jurisdictions to assemble a comprehensive database to assist the community in assuring accurate resource analysis material from which to make informed decisions concerning this limited resource. It is essential for Verde Valley communities to be able to access reliable data and track the decision-making process for the greatest understanding of water matters and community and regional consensus. It is also important to standardize methods and record keeping as much as possible to facilitate comparisons.

The City should continue working with WAC and assume an active role in formulating and implementing a regional water management program to ensure adequate water supply for both existing and future water users. An effective water management program should consider both water supply and demands. Comprehensive supply and demand management allows the flexibility needed to address changing water resources issues. Supply management includes substitution of renewable water sources for non-renewable groundwater resources. Demand management, which includes water conservation efforts, allows available water supplies to serve more users or to extend supplies over a longer period of time.

Groundwater right holders should also be part of the management structure. Right holders are the most familiar with their individual needs and ability to respond to water resources issues.

Public education on water matters and public involvement in management program development is important in sustaining a strong and effective water management effort. Water management efforts should consider economic impacts and feasibility. Attaining the water management goals requires public and private expenditures. Water management programs, however, should be based on sound economic planning principles.

Water management efforts should also be consistent with and enhance the quality of life in the community. Conservation practices and the substitution of renewable water supplies for non-renewable groundwater

helps to provide a more secure future for all water users. Many conservation investments help reduce costs and labor. Social values, public and environmental quality considerations should also be recognized.

Reuse is another important source of supply. Wastewater is the only supply that will grow as the population increases. Expansion of the City's reclaimed water system to serve more irrigation and commercial customers should be explored by the City.

Acquifer recharge techniques and gray water use should also be evaluated.

## **On-going Conservation Planning Considerations**

The **Sedona Community Plan** does not contain a Conservation Element. However, as discussed in the original Situation Assessment of the Community Plan, and from issues identified at community meetings, the water quality of Oak Creek and the groundwater aquifer; pollution threat of these water resources, water erosion and flooding are all critical concerns of the Sedona community. Although not required, Cities under 50,000 population may include a Conservation Plan Element as part of their general plan. This could be evaluated to more comprehensively address protection of water resources.

The need to educate consumers on the importance of water conservation and management of available water resources is necessary to ensure that water supplies continue to meet the needs of existing residents as well as future users.

Conserving water can allow limited supplies to meet the needs of a growing population. Water conservation programs may include detecting and repairing leaks, installing more water efficient plumbing fixtures and appliances, replacing turf and other water-thirsty vegetation with drought-tolerant plants, sculpting landscapes to harvest rainfall, and irrigating with drip systems instead of sprinklers. Individuals play an important role in conservation by using water carefully around the house.

Another approach to conserving supplies of high-quality surface and groundwater is to treat and use lower-quality waters, such as sewage water. Treated sewage, known as effluent, has become a valuable resource. This dependable and growing supply increasingly is used to irrigate non-food crops, golf courses, parks and schoolyards.

## 11.4 ACTION PROGRAM

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The Action Program for the *Water Resources Element* of the **Sedona Community Plan** lists the specific action necessary to implement the Community Plan.

The Planning and Zoning Commission should review and provide recommendations to the City Council for revising the following Action Program on an annual basis in order to continue to pursue implementation of the **Sedona Community Plan** in an expeditious manner and to coincide with the annual strategic planning and Flexible Capital Budget process.

### Future Actions

1. Support and participate in the preparation of a Regional Water Resource Study and comprehensive groundwater database through cooperation with other agencies and water companies.
2. Support and participate in the formulation and implementation of a regional water management program to ensure adequate water supply for both existing and future water users. An effective water management program should consider both water supply and demand management programs. Water management programs should provide a stable institutional structure that brings certainty to water resource issues. Groundwater right holders must implement long-range plans. This can be accomplished within a structure that provides regulatory stability. Management programs should be clear and free of ambiguity.
3. Adopt City-wide golf course standards that ensure no depletions to the aquifer occur from the irrigation of golf courses and to encourage the use or re-use of effluent (adopted).
4. Formulate, adopt and implement a community-wide water resource conservation program to encourage conservation consciousness on the part of Sedona residents, business, property owners and developers. Water Conservation tools to consider include:
  - Water conserving designs
  - Use of low water use/drought tolerant plants
  - Reduction of high water using turf or plants
  - Incorporation of rainwater harvesting techniques
  - Appropriate irrigation methods and water efficient scheduling by plant type, site conditions and seasonal water needs
  - Soil improvement and the use of mulches to retain soil moisture and reduce evaporation
  - Proper maintenance practices
5. Evaluate opportunities that promote the reuse of effluent. Wastewater is the only supply that will grow as the population increases. Expansion of the City's reclaimed water system to serve more irrigation and commercial customers should be explored by the City.

6. Evaluate potential aquifer recharge techniques.
7. Evaluate the need for a Conservation Plan Element of the Sedona Community Plan to establish comprehensive strategies for community flood control, pollution prevention and control, soil erosion, watershed protection, stream protection and other natural resources conservation.
8. Investigate acquisition of private water companies.